# Influence of Global Change on Regional Air Quality in the Pacific Northwest and Northern Midwest Regions

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Global climate change, land use changes, and population growth are interrelated forces that can cause significant changes in future air quality in the U.S. In this work, we address the consequences of global climate change for air quality in the continental U.S., with a specific focus on the Pacific Northwest and Northern Midwest regions. To do this, we employ a multi-scale numerical modeling system, which is comprised of global scale and nested regional models. On the global scale, we employ the National Center for Atmospheric Research (NCAR)/U.S. Department of Energy Parallel Climate Model (PCM) and the NCAR Model for Ozone and Related Chemical Tracers (MOZART) chemical transport model. The Fifth-Generation Mesoscale Model (MM5)/Sparse Matrix Operating Kernel Emissions (SMOKE) processor/Community Multiscale Air Quality (CMAQ) modeling system is used to refine global scale model outputs to simulate continental and regional scale air quality.

Global and regional scale simulations are conducted for a future period (2045–2055) based on predicted climatology and emissions and compared to base case simulations of a contemporary climate realization (1990–2000). For contemporary simulations, U.S. anthropogenic emissions are based on the National Emissions trend 1999 (NEI99) dataset, while future-year anthropogenic emissions are projected using emission growth factors from the U.S. Environmental Protection Agency's (U.S. EPA) Economic Growth Analysis System (EGAS), along with the Intergovernmental Panel on Climate Change (IPCC) "business as usual" (A2) scenario. Biogenic emissions are treated using the new biogenic emissions Model of Emissions of Gases and Aerosols from Nature (MEGAN). In addition, a newly developed stochastic Fire Scenario Builder (FSB) is implemented to estimate prescribed and wild land fire emissions for current and future scenarios. In this poster, we present an analysis of the results of both contemporary and future long-term global air quality simulations as a result of changes in global climatology. This analysis is described in terms of changes in the incoming air mass transported from Asia (boundary

conditions) for the Pacific Northwest region. In addition, preliminary modeling results for the continental U.S. are presented.